

as to cut the tape off and allow the operator to finish the end of the tape. This cycle may then be repeated in taping the next seam in the operation.

In the case where the operator is merely patching nail or screw holes in the wallboard, e.g., or in those situations where no tape feed is desired, the valve 133 may be closed so as to prevent the feed of joint compound through tape supply nozzle 135 and joint compound may be fed exclusively through orifice 183 and orifice 189.

In order to effectuate the process and apparatus of the present invention, it is necessary to utilize a fast-drying joint compound so as to allow multiple coats to be disposed one upon the other in a substantially simultaneous manner. In this regard, Applicant has developed a joint compound comprising about 45% by weight of calcium sulfate, about 35% by weight of a room temperature, evaporable alcohol, about 10% by weight of polyvinyl alcohol, about 5% by weight of polyvinyl acetate, about 3% by weight talc, and about 2% by weight mica.

By room temperature evaporable alcohol is meant an alcohol which will readily evaporate under conventional room temperatures in the building trades. Methyl, ethyl and propyl alcohols having been found suitable for this use. Preferably, the alcohol comprises commercially denatured ethyl alcohol.

As previously noted, the present apparatus allows for the taping of joints between pieces of wallboard by the substantially simultaneous steps of (a) applying a first layer of a joint compound to the joint between pieces of wallboard, the first layer of joint compound having a first predetermined width, the first layer of the joint compound being substantially centered, widthwise, on the joint; (b) embedding a wallboard tape in the first layer of the joint compound, the wallboard tape having a width substantially equal to the first predetermined width, the wallboard tape being substantially centered, widthwise, on the joint; and (c) overcoating of the embedded wallboard tape with at least one additional layer of the joint compound, the at least one additional layer of joint compound having a width greater than the first predetermined width, the at least one additional layer of the joint compound being substantially centered, widthwise, on the joint.

FIG. 11 is a detailed overall illustration showing the functional interrelationship of the components. The backpack BP, shown in detail in FIGS. 1a and 1b, includes pumps 15 and 16. The electrical supply ES which could be batteries, but in the preferred embodiment is connected to a 110V AC supply and includes a step-down transformer, AC-to-DC converter, regulator, and the usual safety features (not shown), and supplies operating potentials to the various electrical and electronic components.

For rental purposes, microprocessor MP1 may be used to sense operation of pumps 15 and 16 and in conjunction with a usage meter clock UMC, monitor the overall period of use of the apparatus and at the end of a predetermined period of time, disables the apparatus by disabling the electrical supply ES. Where the machine is part of a rental system, this feature prevents unauthorized use. A manual reenabling ME, such as a key or a replacement of component that is disabled upon elapse of the predetermined time period, is used to reactivate the electrical supply system.

As described earlier, when the system is initially activated (after loading the backpack container with joint compound and the tape supply element 71 with tape),

pumps 15 and 16, under control of microprocessor MP2 are energized to pressurize the joint compound fluid lines schematically illustrated in FIG. 11 by lines FL1 and FL2, but described in detail earlier herein. Joint compound is supplied to nozzle 135 and in the manual mode the operator activates the tape advance drive stepping motor 157 and rollers 165 and 167 to advance the tape past nozzle 135 a predetermined amount to thereby coat a predetermined length of tape. This predetermined length is from nozzle 135 to the edge of the head beyond blade 215 (FIG. 8) and in advance of printing roller 219. When the joint compound side of the joint tape is pressed onto the joint, sets of gauge wheels GW1, GW2 operate a linkage LK (shown dotted in FIG. 8) to open gates 195 and 191 to allow joint compound to flow through and be spread by nozzles 183, 189 onto the embedded joint tape by virtue of the operation of pump motor 15. As discussed earlier, the pump motors are controlled by microprocessor MP2.

As shown in FIG. 11, a tape usage or rate generator TRG, which in this embodiment is a conventional optical disk sensing device which converts rotation of the optical disk to an electrical signal corresponding to the rate tape is removed from the tape reel. This signal is supplied to the microprocessor MP2 so that the rate the workman draws the device along a joint to be taped controls via microprocessor MP2 the joint compound and pump motors 15, 16 thereby delivering joint compound to the nozzles 135, 183 and 189 at the precise rate required to assure uniform high quality joints regardless of this skill level of the operator.

As the tape with joint compound is laid down, a bank of spring biased depth sensing rollers 199 smooths out any air bubbles that may be trapped in the joint compound and tape irregularities and at the same time measure or sense the position of depth sensors DS which gauge the depth of the tape and also senses any departures or variations from a predetermined depth, which may be loaded into microprocessor MP2 from a PROM memory element M.

FIGS. 13a and 13b show one form of position of depth sensor. The position sensor shown in FIG. 13a includes a coupling member 300 coupled to the roller wheel 199, such as spring biased linkage 207L (or to the top of the blade control push-pull rods discussed later). Pivotal lever member 301 is biased by spring 302 in engagement with member 300 at one end thereof and the opposite end of lever 301 is engagement with tubular resistance wire carrier tube 304. The lower end of carrier tube 304 is engaged by a spring 305 so as to maintain engagement of the upper end of tube 304 with lever 301. It will be appreciated that lever 301 may be pivotally coupled to the ends of rod 300 and tube 304.

Tube 304, shown enlarged in FIG. 13b has winding W with high density windings in the center lower density windings at each end with a linear graduation of the windings between the ends and constitutes a sensor tube or rod SR. A reference brush RB applies a predetermined level VR of voltage to one end of sensor rod SR. (This voltage level is controlled by microprocessor MP2.) A pair of sensor brushes or wipers SA and SB are spaced a small distance D1 apart and the average of the voltages on each sensor brush SA and SB constitutes the position of the sensor rod SR. This voltage is converted to digital by an analog-to-digital converter. Arrow IF indicates a mechanical input signal. It will be appreciated that other forms of position transducers may be used. For example, linear variable differential